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SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE •

JULY 21, 1934

Rival of Lightning

See Page 37

A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XXVI *No. 693*

The Weekly Summary of Current Science

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Edited by WATSON DAVIS

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DO YOU KNOW?

Great coal seams occur within a hundred miles of the South Pole.

The Great Lakes region is known to weather men as one of the stormiest lands in the world.

A new fumigant is being successfully used to fight the "bookworm" that eats up books and bindings.

Canada is trying to create a market for her wheat surplus by using grain alcohol as motor car fuel.

China has begun to adopt American methods of soil survey, and is taking an inventory of her soil fertility resources.

Grasshopper poisoning, if properly conducted, will do little or no injury to birds, says the Bureau of Biological Survey.

Sales of Japanese silks in the United States have become reduced to a point where the Japanese silk industry is endangered.

A telescope now being constructed for Padua Observatory will be the largest in Italy.

Modern doctors have never agreed in identifying the cause of the poet Milton's blindness.

In 1868, the death rate for New York City's slum areas was six times what it is today.

Snakes, as a whole, are beneficial to mankind in that they destroy myriads of insects and rodents.

The usual interval between a lightning flash and the rumble of thunder is 50 to 75 seconds.

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What is the advice of physicians regarding travel to California? p. 45.

Why does prosperity favor the increase of smallpox? p. 39.

RADIO

How can announcements at the end of radio programs be cut out? p. 38.

ZOOLOGY

What is the age record for a tortoise? p. 39.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but the references for further reading. Books cited can be supplied by Book Department, Science News Letter, at publishers' prices, prepaid in the United States.

ENTOMOLOGY

Corn Conqueror in First Round of Chinch-Bug Fight

Trench Warfare in Addition to Barriers of Creosote And Pit Traps Served as Defence Against Marauders

COUNT round one in favor of King Corn in his battle against Kid Chinch-Bug.

With the able seconding of farmers and scientists, the most vicious onslaught of the boring-in enemy of Uncle Sam's principal grain crop has been stopped. The fight now enters the second round, with no predictions good for much, though the odds seem to favor Corn again.

When the oats crop, the chinch-bug's first training-table, began to dry up in the early summer heat, the insects started their regular invasion of the corn-fields. Here they were met by trenches, barriers of creosote oil, and pit-traps in which they could be burned or crushed. In general, throughout the whole corn belt of the Midwest, alert farmers supplied with ammunition by State and Federal authorities kept their fields free of the crawling hordes. Practically all the chinch-bugs that tried to get into the corn were blocked out, and subsequently destroyed.

Now the crawling stage of the first brood of the bugs has ended. The survivors that did not attempt direct assault on the corn have grown their wings and flown over the barriers. They are at present feeding in reduced numbers in the corn, but not doing it appreciable harm.

Real Threat to Come

Their real threat will come after they have bred, for their offspring are the insects that will survive the winter, lurking in stubble and in the weeds and grasses of the fencerows, to be ready to make a fresh attack next year.

This renewed threat will be met by cleaning up the fields, plowing the stubble under, and where practicable by burning the growth along the fencerows.

Principally, however, the question whether 1935 will be another bad chinch-bug year will have to depend on the winter weather. January and February may be the Midwestern farmer's best friends, as they were once Russia's best generals, when Napoleon retreated from Moscow. But if the winter months turn out to be too mild, the chinch-bug war will have to be renewed next summer.

Chinch-bugs have spread over territory far to the north of their usual range, due to a succession of hot, dry summers in the past few years. In Iowa, for example, they normally occur in troublesome numbers only in the extreme southwestern corner of the state and to some extent across the southern tier of counties. At present they are rated as "bad" well up into central Iowa, as far north as Des Moines, and reported "present" clear up into the northeastern section, though not reaching to the extreme northeastern corner of the state.

The areas hardest hit by the pest are Missouri, southern Iowa, Illinois, and northwestern and northeastern Indiana.

Nearly a million dollars has been spent by the United States Government in battling the enemy, and the results have been very satisfactory. During the time when the insects were migrating from the small grain to the corn and the pest fighters were working frantically to provide barriers against this migration, the United States Government distributed about seven million gallons of creosote oil to the states for this purpose.

The next generation of the insects will begin their attack during the present season.

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PHYSIOLOGY

Radio Currents Add To Knowledge of the Brain

THE same kind of electrical impulses that carry music and speech to your radio promises to aid in discovering the unknown functions of the deeper regions of the brain.

Dr. Clarence W. Brown of the University of California psychology department uses high frequency radio currents in blocking out those parts of the brain which are not accessible to study by

BABY LOCOMOTIVE

This diminutive locomotive, running on a single rubber tire, was developed in Germany for the economical shunting of freight cars. One "engineer" can operate the device without difficulty, and when the car is in place, the device can be detached and then will travel under its own power across ordinary paving to another part of the railroad station. The small wheel in front enables it to cross the rails. An ordinary commercial fuel mixture operates the shunting device.

other surgical procedures. These regions are put out of function without the actual removal of any tissue.

The current used has a frequency of three million cycles, which cannot be felt by the animal. It is conducted into the brain by means of a pointed electrode fourteen thousandths of an inch in diameter, the region affected being immediately adjacent to the tip.

The higher cortical centers of the brain are not greatly affected, as is the case with other methods, so the animals remain normally healthy and can be studied for an indefinite time. This makes it possible to study the relation between the nervous centers blocked out and all of the many activities of the animal. In this manner it is possible to learn just how the various parts of the brain function in controlling the different activities of the body.

Dr. Brown is particularly interested in investigating emotional responses. Fear, anger and play responses in cats are now being studied.

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PHYSICS—RADIO

More Ionized Layers Are Suggested by Scientist

Above the Already Known "E" and "F" Layers May Be Layers "G" and "H" at Heights of 375 and 725 Miles

TWO new "roofs" of ionized electrical particles far above the earth are suggested by Dr. Harry Rowe Mimno of Harvard University in a letter to the British scientific journal, *Nature*, just published. Experiments on the reflection of radio waves indicate that echo layers "G" and "H" may soon be added to the layers "E" and "F" already known to science.

Electrical roof "G," Dr. Mimno indicates in his communication, is probably at an altitude of 375 miles above the surface of the earth. Layer "H" seems to be at a height around 725 miles.

The already known layers are at altitudes of 62 miles and 155 miles.

Reflecting layers of ionized, or electrically charged, air molecules high above the earth have been known since 1902 when Prof. A. E. Kennelly of Harvard University and Prof. O. Heaviside in England independently came to the conclusion that such layers must exist to explain the long distance transmission of radio waves.

The Ionosphere

The reflecting layers, later found, are called the Kennelly-Heaviside layers in honor of these two men. All the layers are now generally known collectively as the "Ionosphere." Ordinary broadcasting is commonly reflected by the lowest of the reflecting layers, at 62 miles.

Within 50 or 100 miles of a powerful broadcast station the reflecting layers are not needed for reception because the "ground" wave has sufficient intensity. Beyond this range, however, reception is possible only because the radio waves go up to a reflecting layer and are then turned back down to earth as if they had hit some radio mirror.

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ICHTHYOLOGY

Color Changes in Fish Determined by Half an Eye

FISHES that grow darker or lighter, chameleon-fashion, to match their backgrounds, do so in response to stimuli perceived with only "half an eye." Experiments establishing this point were described by Prof. Francis B. Sumner of the Scripps Institution of Oceanography, La Jolla, Calif., before the meeting of the American Association for the Advancement of Science.

Prof. Sumner slipped over each eye of the fishes used in the experiments a close-fitting little cap of transparent celluloid-like material, which clung closer than the traditional monocle of the English dandy. When part of the surface of these "fish-monocles" was darkened in such a way as to prevent light from reaching the upper half of the retina, or light-sensitive layer of the eye, the fish became dark, just as it would have done in a black-lined acquarium. But darkening the lower half of the retina had no such effect; on the contrary, under certain circumstances it produced an opposite effect. As Prof. Sumner explained it, "Increasing the apparent source of illumination (the background remaining constant) tends to cali forth the same response as darkening the background."

Prof. Sumner also reported, in another paper, an experiment intended to determine whether the color of mammals' hair can be changed by light stimuli, as can the skin color of lower vertebrates, the fishes, amphibians and reptiles.

He kept numbers of mice in cages painted in various colors, and even supplied with suitably dyed nesting materials. The cages were subjected to bright light, both day and night. The mice, however, "did not turn a hair"; so that Prof. Sumner concluded that the color of their surroundings meant nothing to them in determining the color of their hair.

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ENGINEERING

Smoothness of Surface Now Indicated by Sound

IT IS now possible to "hear" how smooth a polished surface really is.

Irregularities on a polished metal surface are now transformed into sound by a needle and amplifying apparatus similar to a victrola, it is reported by the metallurgical magazine, *Metals and Alloys*. When the needle passes over the surface it encounters minute hills and valleys which set up vibrations on a diaphragm. A very smooth surface would emit a very high note as the ridges are small and close together, while a coarse surface would give out a bass note.

A method for determining the same thing was developed several years ago in France. This made use of the photoelectric cell and is considered by Dr. P. H. Heyl of the National Bureau of Standards to be a slightly more accurate gage of smoothness, but the apparatus involved is somewhat more complex. Light was focused on a surface and its reflection directed on a photoelectric cell. Variations in the resulting current indicated the ridges and hollows.

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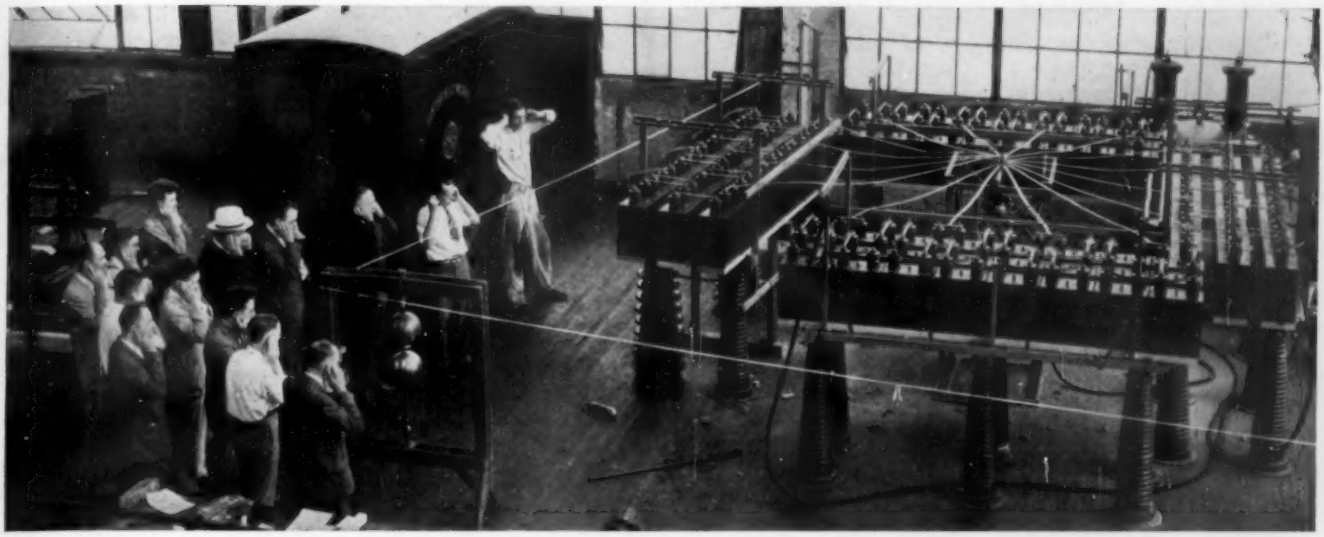
Mechanical refrigeration is valuable to about 300 industries.



ARE THEY SCARED ?

Visitors waiting for flash marking 250,000 ampere display of artificial lightning at Pittsfield, Mass., plant of General Electric Co. Thunderlike sound accompanied the discharge. Current in natural lightning seldom rises above 150,000 amperes. The high-current demonstration is part of research to find more effective ways of guarding power transmission lines from lightning shocks.

PHYSICS

Artificial Lightning More Powerful Than Nature's

Electrical Current Amounting to 250,000 Amperes Makes Impressive Display for Visitors to Laboratory

MAN-MADE lightning rivaling nature's own thunderbolts with electrical current of 250,000 amperes was put on display at Pittsfield, Mass., recently in a crashing, flaming exhibition by engineers of the General Electric Company's high voltage laboratory.

Measurements of current surges in power lines have indicated that a direct hit by a natural stroke of lightning causes the current to mount to only 150,000 amperes. The current in the demonstration was discharged at 150,000 volts potential.

The electrical power expended during the eight one-millionths of a second of the flashing "bolt" was 30,000,000,000 watts. This is thirty times the electrical power developed by the hydro-electric plants at Niagara Falls and as much as the combined electrical output of all the electric plants in the United States.

Ordinary copper wires for handling heavy currents were blown apart and vaporized in a few millionths of a second during the demonstration. A section of reenforced concrete was shattered by the impact of the artificial lightning bolt just as a concrete structure is sometimes wrecked by natural lightning.

A metallic conductor large enough to carry the tremendous current without fusing is subjected to powerful mechanical forces during its transmission of the current. A flat strip of copper shows the "pinch effect" which changes it from a ribbon to a nearly round cross section.

The new high current apparatus is a companion instrument for the 10,000,000 volt artificial lightning generator already in use at General Electric's high voltage laboratory. Both instruments are used in the research which the company is and has been making to study the effect of natural lightning on long distance power transmission lines.

Already many protectives have been devised to improve the service to distant places which formerly was interrupted by lightning strikes.

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MARINE ENGINEERING

Ship's Propeller Should Be In Bow As Is Seal's

IF MARINE engineers really wanted to increase the speed of great ocean liners they would put the ship's propeller in the bow and make it act as a "puller" instead of a "pusher" as now used. This is the verdict of the German scientist, Dr. Heinz Judis, after a study of the methods of movement in fast-swimming sea animals like the penguins, dolphins, seals and sharks.

All these animals, which gain remarkable speed in spite of comparatively small effort, have two sets of "propellers" which are the fins in front and rear. But in fast swimming only the forward fins are employed for straight-ahead motion. The tail fin serves mainly for steering.

A ship produces a bow wave, a resonance wave, and a system of stern waves. At high speeds these complicated wave systems constitute the major part of the total resistance, declared Dr. Judis.

Every propeller, and so also a penguin's wings, says Dr. Judis, produces a system of waves. But when a penguin is swimming fast, the waves produced by the wings cancel the bow waves so that the animal saves nearly the whole of this resistance.

Towing tests on a dead penguin made at the Berlin Institute of Shipbuilding Research showed that the resistance decreased the moment that the water began to flow over the shoulders of the animal, and the bow wave then almost disappeared.

Dr. Judis equipped a boat with fins and a mechanism by which the com-

bined flapping and feathering motion of a penguin's wings could be simulated. The wooden fins were of necessity stiff, whereas they should have been flexible. But despite this defect the results exceeded expectations. The boat propelled by two men made 2.8 to 3.7 miles per hour.

For comparison, the boat was also equipped with paddles, and was driven in each case at 6.2 miles per hour. Photographs showed that with the paddles strong bow waves were developed, but with the fins they were almost entirely absent.

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DENDROLOGY

200 Elms Killed Daily By Dutch Elm Disease in East

FINE old elm trees, of which the eastern states are so justly proud, are now succumbing to a renewed attack of the Dutch Elm disease at the staggering rate of 200 a day.

The ravages of this affliction have become so serious that Congress appropriated $150,000 now being used for the work of checking the blight. Already death has reached 3,027 shade trees in the region around New York.

The greatest loss has been suffered by New Jersey where the mortality of elms to date is 2,456. And each day new cases of the disease are discovered. The only check which has been found by scientists working against this plague is to chop down and burn the trees the moment tests have shown them to be infected.

The Dutch Elm disease first appeared in 1920 in Holland. It waged a destructive war against European elms and then proceeded to cross the ocean in the holds of ships carrying elm logs for the furniture industry.

It made its first appearance in a flank attack in Ohio three years ago, but not seriously as only nine elms were felled and immediate action checked further damage.

Carried By Beetle

In the last few months, however, it has stabbed the heart of the elm region around the port of New York. A small bark beetle, Scolytus, carries the infection in the form of a fungus known as Graphium ulmi which attacks the smaller twigs and withers whole branches of the tree.

None of our native elms seems to be immune, although an oriental variety is not infected. This tree, imported from Asia, can nevertheless be a harborer of the disease and should also be destroyed if it is found to be bearing the fungus.

When queried as to whether this epidemic will have the terrible effects of the blight which years ago stilled the whistles of so many chestnut venders, U. S. Department of Agriculture scientists declared it equally serious from its present aspect. Whether a wholesale slaughter of elms will take place in the future can not yet be foretold.

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RADIO

Radio Device Blocks Out Parts of Programs

A DEVICE which automatically tunes out any part, or the whole, of a radio program has been patented by Floyd G. Caskey, Washington inventor.

If the listener wishes to turn off his radio for one minute intervals every fifteen minutes it is only necessary to push a button in an attachment on the radio set and the instrument goes "dead" for the desired interval and then turns itself back on. The new radio appliance is not necessarily attached directly to the set but can be operated by remote control while the listener sits on the other side of the room in an easy chair.

Numerous devices for eliminating undesired parts of radio program, either advertising talks or any type of speech, have been invented before. At the 1933 meeting of the American Association for the Advancement of Science Prof. G. W. Kenrick of Tufts College described a mechanism which automatically shuts off a radio set for fifteen seconds every time there is silence on the program for a quarter of a second. Thus if an announcer pauses, as he must, for breath, the set will be silent for fifteen seconds. If he is still talking at the end of that time it will stop again. Only when a continuous flow of music comes in will the device operate steadily.

In the new device of Mr. Caskey, the radio listener looks at the radio program before it starts, and pushes one or more buttons to block out the program at intervals when silence is desired. This act brings the sought-after result, but what happens in the mechanism is essentially the following:

Pressing down each button switches off the radio receiver and at the same time starts a small electric motor of the synchronous type used in electric clocks. This motor, turning at constant speed, operates a train of gears which restores the switch key to its "on" position after the desired interruption in the program.

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GENERAL SCIENCE

Sweden's Crown Prince To Take Part in Expedition

WHILE Dr. Sven Hedin, one of Sweden's best known scientific adventurers, has been having adventures with Chinese bandits, other Swedish scientists have been making ready for expeditions to distant fields.

Crown Prince Adolf, who ranks as one of Sweden's leading archaeologists, will set out for Baghdad in the autumn to take part in excavations in Mesopotamia.

An ethnologist of the Swedish National Museum, Henry Wassen, is making ready to sail for South America, to continue studying the Chaco Indians of Colombia, a work begun by the late Swedish scientist Erland Nordenskiold.

The geologist Prof. Hans Ahlmann will join with the Norwegian Prof. Sverdrup to observe glaciers in the interior of Spitzbergen. And four Swedish zoologists are setting out for Brittany, to continue experiments with the eggs of sea-urchins, in research expected to throw valuable light on phases of evolution.

Among Sweden's scientific representatives already abroad, is Dr. Carl T. W. Hammarlund who is studying potato plants in the mountains of Chile and Peru, in the hope of discovering a potato more resistant to frost and insects than potatoes now grown in Sweden. In India, Dr. Walter Kaudern is making biological studies and seeking rare orchids, with the mission of bringing back their seeds for the King of England.

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ZOOLOGY

Giant Land Tortoise Holds Old Age Record

CENTURIES-OLD reptiles and other animals may have their place in folklore but the oldest recorded life span ever attained in backboned animals, that science knows for a certainty, is 152 years.

For a century and a half dwellers on the island of Mauritius near Madagascar observed a giant land tortoise originally brought from islands in the Indian Ocean in 1766. When Mauritius was handed over to the British in 1810 the tortoise was moved to the artillery barracks of Fort Louis and lived there until 1918.

Karl P. Schmidt, assistant curator of reptiles at the Field Museum in Chicago, says that from this recorded case there is substance to the reputed antiquity of reptiles. Actual records of longevity, however, are hard to obtain.

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MODERN BABYLON

This structure at Boulder Dam represents the application of all the newest knowledge of engineering, yet in appearance it is reminiscent of long bygone days.

PUBLIC HEALTH

Smallpox May Increase With Return of Prosperity

WILL our economic recovery be marred by an increase in smallpox? This unpleasant possibility was pointed out by Dr. A. W. Hedrich of the Johns Hopkins School of Hygiene and Public Health at a recent conference of health officers in Washington.

Dr. Hedrich called attention to the fact that in the past the number of cases of smallpox in the United States has shown a tendency to rise and fall synchronously with the increase and decline of prosperity. Smallpox seemed to reach peaks in 1920, 1924 and 1930. Since 1930, during a period of economic depression, there has been a decline in smallpox cases in almost all parts of the country. A similar decline took place during the economic depression of 1921-1922.

Due To Labor Movements

The explanation for this observed relation between smallpox incidence and economic conditions is to be found in the movements of laborers during periods of prosperity and depression, Dr. Hedrich believes.

"It seems entirely possible that the increases during prosperous periods reflect such forces as the movements of negroes from the rural regions of the South into the industrial centers of the North and the importation of Mexican labor," Dr. Hedrich stated. "Conversely during periods of depression the movement tends to be away from the city back to the farm to escape the high cost of food and shelter in the city.

"This raises the question whether with the return of prosperity and the probable smuggling of Mexican labor into the United States we shall not again be confronted with an increase in malignant smallpox. Certainly the greatest vigilance in this respect is called for."

A study of the smallpox history of the United States shows that cases coming into large American cities from other countries have been responsible for many of the severe outbreaks of the past. In addition it appears that it is the migrant laborer, the hobo and persons of similar type who have imported virulent smallpox into the United States, or have brought it from unvaccinated rural regions into the cities where it spread to epidemic size among their large, crowded populations.

"National protection from smallpox depends largely upon well vaccinated cities," Dr. Hedrich declared.

Apparently it would be well for the Blue Eagle of recovery to carry smallpox vaccine with him on his flights to farm and city.

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ARCHAEOLOGY

Will Seek Prehistoric Remains on Damsite

BEFORE engineers pour in tons of water to create an artificial lake at the great Bonneville dam on the Columbia River, an archaeologist will make the last attempt to explore the dry land for signs of prehistoric Indian life.

Herbert W. Krieger of the Smithsonian Institution, Washington, D. C., will make the search for Indian remains. The region is of particular interest in ancient American events because the Columbia River Valley was one of the natural highways along which migrating groups of people of Asiatic origin would presumably have pushed their way down into the United States.

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METEOROLOGY—RADIO

Radio Waves To Transmit Weather Maps

LOPPING $470,000 from the U. S. Bureau of Air Commerce expenditures, radio typewriters may soon give the skies a chance to replace 13,000 miles of leased telephone wires now used in sending out weather maps.

Because of the great saving a method of radio-typing would effect over present telegraphic costs contained in the U. S. Department of Commerce aeronautical bureau's $4,000,000 appropriation, Rex Martin, Assistant Director of Air Navigation, and engineers under him are eagerly testing a new device for sending out weather forecasts.

The radiotype transmitter resembles an ordinary typewriter. A key is punched and immediately radio wave impulses travel through the ether and cause the same letter to be struck at the receiving end. The speed of this method of communication is 75 words a minute, but it can be stepped up to 210 words. Seven and a half minutes were required to send out a complete weather map by the new method in comparison to 15 minutes by telegraph.

Weather data is sent out similarly by an instrument resembling a tabulating machine with perforated holes on a drum corresponding to the position of the data on a map.

If experiments near Washington prove successful the Bureau of Air Commerce expects to provide stations every 50 miles along the 20,000 miles of airway over which flights are taking place daily. Anyone who had suitable receiving equipment could obtain the weather information.

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ENGINEERING

Safety in Air Travel By Keeping Ice From Engine

ICE may cause airplane wrecks in hot weather as well as in cold by forming a coating inside the carburetor, interfering with its proper functioning by cutting off the intake. This danger to aviation can be eliminated without lowering engine power by applying exhaust heat directly to the carburetor walls.

It is believed that some otherwise mysterious airplane accidents have been due to ice-lined carburetors.

In a number of experiments conducted under the direction of H. K. Cummings, division chief at the National Bureau of Standards, it has been found that fuel volatility, altitude, and weather conditions are all factors in engine failures of this origin. If the gasoline is highly volatile, like ether or naphtha, it absorbs more heat from the carburetor walls, leaving them cold enough for water vapor in the intake mixture to condense and form a coat of ice which grows thicker and thicker until the channel is nearly plugged. At high altitudes the air is thinner. This increases volatility, and therefore the chance of ice formation, but unless the plane is flying through a cloud there is less vapor in the air giving a balancing effect.

Heating of the intake air was tried, but it was found that this lowered engine efficiency because the expansion involved on the application of heat permitted actually less combustible mixture to enter the cylinders. The most satisfactory method found was to heat the carburetor walls directly, using either the exhaust or heat supplied electrically by a coil of wire.

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AERONAUTICS

Astronomer May Train Telescope on Balloon

PLANS are being perfected for astronomers at Des Moines Municipal Observatory to watch the stratosphere balloon of the National Geographic Society-U. S. Army Air Corps if its path through the upper atmosphere comes within seeing range of telescopes there.

Dr. D. W. Morehouse, president of Drake University and well-known astronomer, told Science Service that with his eight and one-half inch diameter refracting or lens telescope the balloon should be visible at a distance of 100 miles if the sky is clear but proportionally less if it is hazy.

If the balloon is seen it should be possible to estimate its distance from the instrument by measuring, with a micrometer, the small angle subtended by the bag's diameter as seen by the observer.

With telescopes astronomers can see stars millions of miles away through space. What will limit observations on the stratosphere balloon to 100 miles is the absorption of light which has to pass through long lengths of the earth's atmosphere, and the limitation fixed by the curvature of the earth.

Science News Letter, July 21, 1934

IN SCIENC

METEOROLOGY

More Heat and Drought Predicted for July

HOTTER weather, and continued less-than-normal rainfall, are to be expected in the great western grain belt during the rest of July, on the basis of statistical probabilities indicated by the June-July temperature records. So Charles D. Reed, senior meteorologist of the U. S. Weather Bureau office, Des Moines, informed a representative of Science Service.

Mr. Reed, who was a member of the Science Advisory Board's special committee on the reorganization of the work of the Weather Bureau, has found in the course of many years' study of weather trends that if the average June temperatures run considerably higher than normal, July following may be expected to have more heat than normal. Moreover, it will probably have less than the normal rainfall.

Mr. Reed's figures show that this correlation between excess temperature and deficient rainfall can be counted on as practically one hundred per cent., when June averages two or three degrees hotter than normal. June this year in Iowa has averaged about eight degrees hotter than normal, so that it looks as nearly like a sure-fire prediction as anything can be that has to do with the weather.

Records from other states in the Midwest indicate that what holds for Iowa will be true for them also. So it looks like more heat and more drought for this grievous summer of 1934.

Mr. Reed hastens to add, however, that less-than-normal rainfall during July will not necessarily mean the ruin of the corn, if the month is not too excessively hot and dry. Throughout the corn belt this most important crop has been thriving astonishingly on the late and rather scanty rains it has received, and if the soil is replenished with even moderate moisture during the rest of the summer, the nation's principal grain crop will be at least adequate, if not exactly of bumper proportions.

Science News Letter, July 21, 1934

NCE FIELDS

NUTRITION

Find Zinc Essential In Animal Diet

ZINC is a necessary part of animal diet, Drs. Gabriel Bertrand and R. C. Bhattacherjee have reported to the Paris Academy of Sciences.

Their conclusion is based on studies of mice. Baby mice as soon as they could be separated from their mothers were divided into two groups. To one group was given food entirely free from zinc, to the other the same food to which a minute quantity of zinc had been added, one part in fifty thousand.

The first group did not thrive from the start. They became thin, emaciated, lost their hair, and died from various ailments after an average life of 17 days.

The second group survived for an average life of 64 days. Post-mortem examinations of this group showed that about a fifth of the zinc administered had been incorporated in the body tissues.

All the mice had the proper amount of vitamins. But without zinc they quickly died.

Science News Letter, July 21, 1934

METALLURGY

Control of Minerals Would Make War More Difficult

CONTROL of minerals vital for wartime use might be a way to prevent world-wide conflicts in the future, suggests Dr. Ward V. Evans, professor of physical chemistry of Northwestern University, in a paper just prepared for the American Chemical Society.

During the World War, says Dr. Evans, Germany turned to nickel for making high-speed tool steel with which to turn out shells. With insufficient nickel ore in Central Europe, Germany bought nickel from Norway. Norway, in turn, purchased nickel from Canada so that England faced the situation of having her soldiers killed by products from within her territorial domain.

"Since the boundaries of nations were established originally from an agricultural viewpoint with no reference to mineral wealth," declared Dr. Evans, "it might be possible now, by properly controlling the materials upon which modern warfare depends, to prevent war entirely. If substances like rare minerals were controlled there might be an assurance of peace."

Two things would be necessary for such a plan to work, however, suggests the Chicago scientist: First, the world must really desire international peace. Second, a survey must be made of mineral wealth as technical progress changes the makeup of the economic pattern of the world.

The key minerals to be controlled at the present time, which are not abundantly supplied to all nations, are chromium, vanadium, manganese and nickel, says Dr. Evans.

Restrictive control of free export and import of these substances at least would make war much more difficult.

Science News Letter, July 21, 1934

PHYSIOLOGY

Existence of New Vitamin Revealed By Experiments

POSSIBLE existence of another hitherto unknown vitamin, with ability to prevent hemorrhage, is seen in experiments just reported by H. Dam of the Biochemical Institute, University, Copenhagen.

Chicks fed an experimental diet developed a disease very much like scurvy, the chief feature being extensive internal hemorrhages, Mr. Dam reported in a note to the British scientific journal, *Nature*. Large doses of anti-scurvy vitamin C in the form of lemon juice and ascorbic acid did not have any effect on the disease. But a diet consisting entirely of cereals or seeds plus salts prevented the occurrence of the hemorrhages.

"The cause of the disease," concluded Mr. Dam, "must therefore be a deficiency in an antihemorrhagic factor different from vitamin C and occurring in cereals and seeds."

Whether this new vitamin is essential for the well-being of men as well as chicks and whether its absence from the diet is responsible for hemorrhagic diseases in human beings has not yet been determined. Mr. Dam is investigating further the nature of the disease in chicks and of the new dietary essential itself.

Science News Letter, July 21, 1934

PUBLIC HEALTH

Health of Nation Is Not So Good in 1934

THE HEALTH of the country is not so good this year as it was last, study of life insurance and U. S. Census Bureau figures shows.

To be sure, 1933 was an all time record year for good health and officials of the Metropolitan Life Insurance Company consider 1934 "by no means an unsatisfactory year from the standpoint of public health." Yet up to the end of May the cumulative mortality rate was 4.4 per cent. higher than for the same months of 1933 their records show, and according to the U. S. Census Bureau's records for 86 leading cities, the deathrate up to the week ending June 2 was 5.1 per cent. above that for the corresponding part of last year.

Deaths from measles and whooping cough were twice the number recorded last year. There have also been increases in the deathrates for cancer, heart disease, diabetes, cerebral hemorrhage, chronic kidney disease, pneumonia, accidents and automobile accidents.

"An unusual element in the record of the current year is the greatly increased death toll of pneumonia, as registered for the very same months that have witnessed a drop of more than one-half in deaths from influenza," officials of the Metropolitan Life Insurance Company pointed out.

"It is obvious, first, that most of the fatal pneumonia cases of 1934, to date, have not been of influenzal origin; and, second, that an extremely cold winter has played a large part in bringing about this abrupt increase in the mortality from pneumonia."

Science News Letter, July 21, 1934

PHYSICS

Tube Which Opened Fair Goes to Stratosphere

THE SAME radio tube which helped "catch" starlight from Arcturus, that had traveled 40 years on the way, and used it to open the Century of Progress in Chicago last year will go up in the stratosphere balloon of the National Geographic Society and the U. S. Army Air Corps. On its present fifteen-mile journey the tube will be used in apparatus for studies of cosmic ray intensity during the ascension.

Science News Letter, July 21, 1934

MEDICINE

Made in America—Tularemia

Disease of Hunters and Ranchers Was Discovered, And the Germ Was Isolated in the United States

By JANE STAFFORD

IN THE baggage car, rabbits and guinea pigs stuffed with germs. Behind in the Pullman, their doctor-custodian, suffering from the same disease. Both were being borne rapidly eastward by a transcontinental express. They were racing against time. They must reach Washington before the animals died and the germs in their bodies were lost to science.

It did not matter that "Eddie" Francis, the doctor-custodian, was so sick he could hardly hold his head up. He might risk his own life by disobeying his doctor's orders and making the journey from Utah to Washington when he should have been in bed. But he could not and would not take any chances with those germs that were growing nicely in the rabbits and guinea pigs, ahead in the baggage car. They were the germs of a brand-new, all-American disease. He had spent all of that long, hot summer in a combination garage-coalshed-laboratory, finding them and coaxing them to grow in the guinea pigs. Now he was taking them back to his chief at the old Hygienic Laboratory of the U. S. Public Health Service in Washington. There he and Uncle Sam's other disease fighters would spend the winter finding out what sort of germs they were and just how they could be tamed. Then, the following spring, the ranchers and hunters of Utah and neighboring states could be saved from the menace of deer-fly fever.

Sickness Mustn't Interfere

That was the plan. A mere trifle like his being desperately sick with the fever himself could not be allowed to spoil it, nor to make useless his entire summer's work. So he lay in his berth, aching and tossing with fever, and worrying about his pigs and his germs. At intervals, he stumbled out to the baggage car to see how the pigs and rabbits were getting along, and dragged himself back to his berth feeling worse and more worried than ever.

But you may be sure that his worry was all for his animals and their germs, not any of it for himself. For "Eddie" Francis—Dr. Edward Francis, Medical Director, U. S. Public Health Service, to you—was and is a dauntless disease-fighter who has lived only for his work of hunting and taming germs. His associates in the Service will tell you that he is "wedded to his work." When other men are playing with their children, he is thinking about his work and the Service. Nor are devotion to his work and determination his only qualifications for research. He has the enthusiastic, vivacious type of mind that is stimulating to others working with him. Just as he is unafraid of the physical dangers of his job, he is fearless and ruthless in assaulting traditional, established beliefs and opinions. He believes in proving everything, leaving nothing to chance.

"Prove it in animals," is his watchword and his constant advice to younger scientists.

Distinguished From First

He was a young man himself when he joined the Service, fresh from an eighteen months' internship in a general hospital. He distinguished himself on his very first job. At that time immigrants at Ellis Island, where he was assigned, stood in line to be inspected by the medical officer for signs of smallpox, yellow fever, plague and other ailments that Uncle Sam's disease fighters are ever on guard against. The health inspection process is done somewhat differently today.

One morning as young Dr. Francis walked past the line of immigrants, he noticed a peculiar sore on the foot of a big strapping West African negro, member of a band of "torture dancers" bound to the Buffalo Exposition for show purposes.

"Guinea worm disease," he pronounced immediately, and he was correct.

Probably not one doctor in ten, with his limited experience, would have noticed the queer-looking sore on the foot of that strong, healthy-appearing black fellow. Not one doctor in ten, with more experience than his, would have recognized at once that the sore was due to an unusual parasitic worm of India, Arabia and the West African Gold Coast.

His chiefs in the Service began to take notice of this keen young recruit. They ordered him to the old Hygienic Laboratory, now the National Institute of Health, and set him at some research work. They found that he took to it like a duck to water. Later, when he was assigned to duty at the Mobile quarantine station, he moved practically all his part of the Hygienic Laboratory down there with him, so he could con-

DR. EDWARD FRANCIS

A RACE WITH DEATH

The story of how one of Uncle Sam's disease fighters raced across the country, hastening to reach his laboratory before death claimed his germ-laden animals and before he succumbed to the fever raging in his own body. This dramatic incident lends color to another of the Pioneers of Medicine series.

tinue his bacteriological studies. Every minute that he was not actually on the ships making his quarantine inspections, he worked in his improvised laboratory.

So it is not surprising that he was picked to make the fights against "the first American disease," tularemia. However, in 1919, when he was assigned to a study of deer-fly fever, no one knew that he was going to discover a brand-new, all-American disease and risk his life in the course of his investigations.

Deer-Fly Blamed

All that was known, officially, was that for many years ranchers and hunters in Utah had been afflicted with a disease which they called deer-fly fever, because they thought it came from the bite of the blood-sucking deer-fly commonly found on horses and cattle in that part of the country. A few days after the bite of the fly, the small lymph glands in the region become swollen and painful. The patient suffers severe chills and then fever lasting for several weeks. Some patients died, all were disabled for weeks or months during midsummer, the busiest season on ranch or farm.

In 1910, a physician of Brigham City, Utah, Dr. R. A. Pearse, had described six cases of this disease at a meeting of the Utah State Medical Association but it had been known for several years before that. By 1919 the situation had become so serious that the State Health Commissioner called on the Surgeon General of the U. S. Public Health Service for aid. In July, 1919, Dr. Francis was on his way to Utah, accompanied by 30 guinea pigs, 30 white mice, 30 white rats and 30 rabbits from the Hygienic Laboratory.

When he arrived at Salt Lake City, the Health Commissioner told him that the disease was most prevalent around the town of Delta, about 100 miles to the southwest. Accordingly, Dr. Francis went to Delta, where he was welcomed by the town's physician, Dr. H. L. Charles. In Dr. Charles' garage, which was also a coalshed, Dr. Francis set up his cages of animals and his laboratory.

Shortly after Dr. Francis' arrival, Dr. Charles was called to see a patient who had been taken sick while mowing alfalfa and had gone to bed with fever and pains in his head, neck and shoulders. He had had a small sore on the right side of his neck which, by the time Dr. Charles, accompanied by Dr. Francis, saw him, had a black center about one-eighth of an inch in diameter and was surrounded by a yellow zone an eighth of an inch wide. Dr. Charles diagnosed the ailment as deer-fly fever.

Transferred the Germs

While he gave directions to the sick man's wife, Dr. Francis drew a little blood from the patient's arm. He took this blood back to his garage-coalshed-laboratory and injected some of it into two of the guinea pigs and two of the rabbits. Five days later, all four animals were dead. Dr. Francis performed very careful autopsies on those animals. He found many whitish spots of dead tissue on their livers and spleens. This was something familiar.

About ten years before, another of Uncle Sam's disease fighters, Dr. G. W. McCoy of the Public Health Service, had found the same sort of spots in the livers and spleens of ground squirrels in California. They were very much like the sort of spots found in animals that have died of plague. Dr. McCoy was looking for plague in the squirrels and rats of California, where an epidemic of this dread rat-borne disease had raged. In the course of his investigations he found that some of the squirrels were suffering from a disease very much like plague, but which was not plague, and which could be given to guinea pigs. Guinea pigs, you know, belong to the rodent family as well as squirrels.

Same as McCoy's

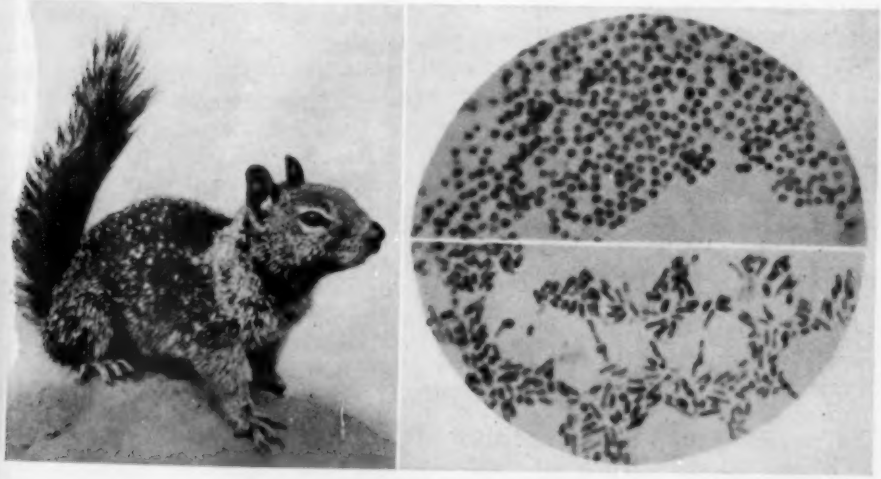
Dr. Francis saw at once that the disease his guinea pigs and rabbits had died of, after having blood from the sick rancher injected into them, was the same as McCoy's plague-like disease of rodents. Dr. McCoy had been able to isolate a micro-organism, or germ, in this disease which he called Bacterium tularense, after Tulare County, California, where he found it. But it was rather a fussy germ and would not thrive on the ordinary laboratory fare of plain bouillon and plain agar. He had to cook up a special culture medium for it using egg-yolk.

That was why Dr. Francis was so worried about the germs he was taking back to Washington. He didn't have any of the special medium for them and he knew he had to keep them alive in guinea pigs. If the pigs died, the germs would be lost.

Twenty-six days after he had been taken sick, the rancher had died. Dr. Francis was allowed to look at his liver and spleen. There he found many of the same sort of tiny white spots that he had seen in all the guinea pig and rabbit livers and spleens when the animals died after being injected with blood from the sick rancher. He cut tiny bits from the spleen of the dead rancher and inoculated them into guinea pigs, too. From these pigs he obtained McCoy's Bacterium tularense.

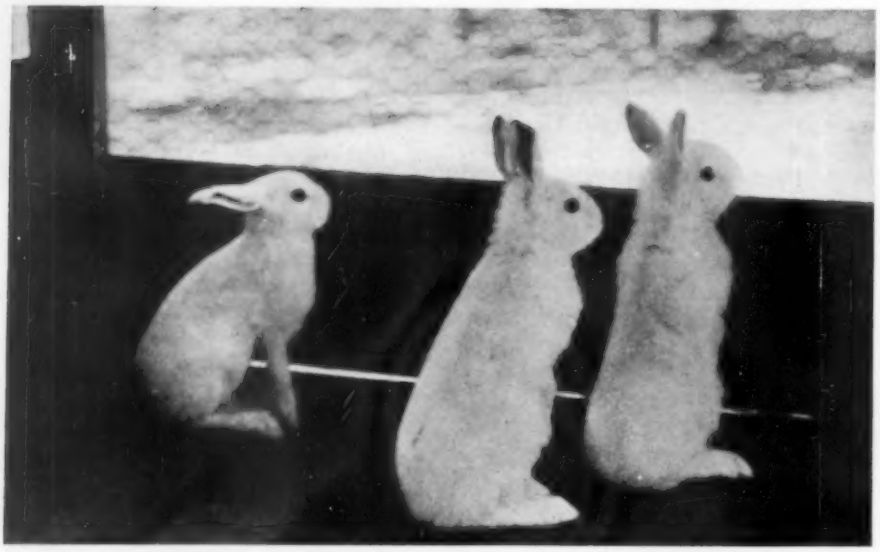
A Victim Himself

Then, just at that exciting moment, and five days after the rancher had died, Dr. Francis began to have chills himself. His temperature rose rapidly, and Dr. Charles ordered him to bed. But instead Dr. Francis made plans for his return journey. He knew that if he was sick in bed for three or four weeks, all the germs from this strange new disease would have died and he, or someone else, if he himself died, would have all the work to do over again. So, sick as



GERMS AND THEIR HOST

This is the original California ground squirrel from which the germ of tularemia was first isolated, and, on the right, two forms of the germ, Bacterium tularense.



BEAUTIFUL VICTIMS

The snowshoe rabbits of Montana are animal hosts of the disease—tularemia has killed thousands of wild rabbits—hunters and others may get the disease from handling the rabbits unless they wear gloves.

he was, he dragged himself around the garage-coalshed, packing his laboratory equipment and getting his animals into travel-cages. It took him two days of arduous effort to get everything ready, but he finally departed, Dr. Charles still protesting.

When he got to Chicago, though he could hardly hold his head up, he bundled the animals and himself into a taxi and rode far out to the north side, to the U. S. Marine Hospital. There he got some fresh, healthy guinea pigs and rabbits and somehow he managed to draw blood from the dying guinea pigs he had brought from Utah, and to shoot this blood, full of deer-fly fever germs, into the healthy guinea pigs and rabbits. Once more he bundled the animals and himself into a taxi and rode back to the railroad station. He was on the last lap of his journey, and he wasn't quite so worried. The germs would thrive in the new animals until they got to Washington the next day.

Gave Up at Last

When he finally arrived, he took the animals to the laboratory, made his report, and explained how the germs must be kept thriving in successive animals. He even tried to do some work himself, but had to give up at last and go to the hospital. It was three months before he was fit for work again.

While he was laid up, he mulled over the facts he had learned about this disease. He decided to call it tularemia, since it was caused by McCoy's Bacterium tularense.

The following summer, he went right back to Utah, taking with him an expert on insects, Dr. Bruce Mayne of the U. S. Public Health Service. Back at the Washington laboratory, Dr. G. C. Lake kept the original germs alive by successive animal passages. Both Dr. Lake and Dr. Mayne became infected and suffered attacks of tularemia that summer. Ten years before, Chapin, who had helped McCoy isolate Bacterium tularense from California ground squirrels, had suffered an attack, though it was not recognized as tularemia or deer-fly fever at that time. Almost every other man who has worked with it in the laboratory has suffered an attack.

Must Wear Gloves

In the course of his investigations the second summer, Dr. Francis found that the disease occurs in wild rabbits, and that it may be carried from sick to healthy rabbits or to men by the deer-fly. A little later he found that men may get the disease simply from handling the infected rabbits, without being bitten by the fly and without having even a tiny scratch on the skin through which the ordinary germ could pass. This was the way Mayne and Chapin and probably Francis himself and Lake all became infected. After that discovery, Dr. Francis warned all laboratory workers to wear gloves when handling the infected animals or the germs in the test tubes. The same warning was passed on to hunters, market dealers and housewives when it was found that these people, too, had been suffering from the disease, which they had called rabbit fever. Thorough cooking of the rabbit meat, even if it has been infected, makes it safe to eat.

Dr. Francis is a striking example of the dictum that a person can contract tularemia only once—or, as the doctors say—one attack confers permanent immunity as in smallpox or yellow fever. To him there is no longer the slightest danger from the bite of the deer-fly, from the bite of the wood tick, from skinning infected rabbits, or from dissecting the most highly infected guinea pigs, rabbits or white mice in his laboratory.

Worked With Bare Hands

His advice to others to wear rubber gloves when dressing wild rabbits is totally disregarded by himself because of his solid immunity acquired fourteen years ago by passing through an attack of the disease. Since that time he has deliberately courted infection by working without protective rubber gloves.

If by chance some virulent germs occasionally find lodgment in a crack or cut on his hands the worst that can follow is a small sore which is well in a week's time without causing any illness, or fever, or interruption to work. While the contents of such a local sore is harmless to his resistant immune body, it is deadly in five days to a guinea pig, rabbit, or white mouse into which it is injected. Such a local sore has occurred on his hands three times since his original attack of tularemia and is learnedly termed by the doctors as a "reaction of immunity."

When Dr. Francis first reported the new disease to the world of science, it was considered a strictly American product. No cases had ever been reported in any other country. It is still an all-American disease in the sense that it was discovered in this country and that Dr. Francis and other American investigators are entirely responsible for finding the germ and the way in which the disease is transmitted. But soon after Dr. Francis' first report was published in 1921, investigators in other countries began finding cases of it.

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PUBLIC HEALTH

Disease Fighters Gather To Fight Infantile Paralysis

California Epidemic is Mild and Now Declining, But Investigators Hope to Find Method of Prevention

HEADED by Dr. James P. Leake, veteran disease fighter of the U. S. Public Health Service, medical scientists from various parts of the country are gathered in California for an attack on the mystery of infantile paralysis which is still epidemic out there.

Latest figures received by the U. S. Public Health Service in Washington, D. C., show a drop in the number of new cases and the federal health authorities hope this means that the peak of the epidemic has been reached. For the week ending July 7 there were 316 cases in the entire country, as compared with 338 for the previous week. Of these 267 were reported from California for July 7, and 297 for the previous week.

However, there will still be plenty of material for the scientists to work at in their efforts to find how the disease spreads, how to prevent future epidemics, whether vaccines and convalescent serum are of real use, and whether, as has been suggested by some authorities, there is an inherited tendency to acquire the disease.

Assisting Dr. Leake will be Drs. E. T. Ceder, A. G. Gilliam and W. P. Dearing, of the U. S. Public Health Service.

Drs. Gilliam and Dearing are newcomers to the Service and this epidemic will provide their "baptism of fire," it was learned at the headquarters of the Service.

A Wedding Gift

Dr. Ceder has already won his spurs in typhus fever investigations, in the course of which he contracted the disease. His assignment to California, coming a few days after his marriage, might seem a hardship to some young men, but to Dr. Ceder, already deeply imbued with the U. S. Public Health Service's traditions of devotion to duty, the opportunity to work on this problem will probably seem in the nature of a wedding present.

Besides the officers of the U. S. Public Health Service, Dr. E. C. Rosenow of the Mayo Clinic and Dr. Leslie T. Webster of the Rockefeller Institute for Medical Research are now in California conducting independent investigations of the epidemic.

The California epidemic is distinguished for the number of mild, non-paralytic cases, Dr. Leake has found. Consequently he feels there is less reason for persons contemplating travel to California to change their itinerary than there would have been during other epidemics. Nevertheless he does advise that children and youths of susceptible age should not take unnecessary risks of exposure by such travel. With this exception, the present epidemic does not seem to "justify any interference with or discouragement to normal business and recreation."

"Protection of children against undue exertion is wise in the presence of infantile paralysis in any community," Surgeon General Hugh S. Cumming of the U. S. Public Health Service has advised.

Science News Letter, July 21, 1934

ENGINEERING

"De-Silted" Water Endangers Power Plants

RUSHING water, released from the placid lakes behind large dams, may bring disaster to some of the great power plants placed in canyons to utilize impounded river water.

Because this danger may threaten the power plants at Boulder, Grand Coulee, Fort Peck, Norris and other dams, engineers of the U. S. Bureau of Reclamation are studying this problem.

In most cases there is no fear that rapid and deep scour will affect the actual stability of the structures themselves, but it is possible that by lowering the level of the river bed below the "exhaust" outlets from the generator turbines their running efficiency may be reduced.

Water running over loose dirt and rocks produces the same grinding action that can be seen when a building is being cleaned with a sand blast. This scour or erosion is the method by which, through many millions of years, rivers have worn great canyons in solid rock.

As the rocks themselves are eroded, the resulting sand and powder is carried downstream and remains in the swirling water until a lake or dam reservoir permits it to settle slowly to the bottom without being stirred up. Then when it goes over a spillway the process begins all over again with renewed energy, and the man-made torrent carries downstream soil away faster than before the dam commenced its work as a filter.

A summary of data on this phenomenon has been compiled by E. W. Lane, research engineer in the U. S. Bureau of Reclamation. It covers most of the major dam failures and maintenance precautions throughout the world in recent years. This problem, he states, is likely to become increasingly important to engineers in the future.

Science News Letter, July 21, 1934

MEDICINE

Develop Vaccine For Infantile Paralysis

FOR OVER a year Dr. W. T. Harrison of the U. S. Public Health Service has been working on a vaccine to give protection against infantile paralysis, the disease now epidemic in California.

He has already had "encouraging" results in protecting monkeys with the vaccine, but he is not yet ready to try it on humans. The vaccine is made by a special technic which officials of the U. S. Public Health Service are not willing to report at present.

Science News Letter, July 21, 1934

▼ RADIO ▲

INFANTILE PARALYSIS

an address by

Dr. W. T. Harrison

Of the National Institute of Health

Wednesday, July 25, at 3:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

ASTRONOMY

Encke's Comet Seen Again On Return Visit to Sun

This Visitor, Which Returns With Great Regularity Every 3 1-3 Years, Is Visible Only Through Big Telescope

ENCKE'S comet, most frequently returning of these visitors from space, has been picked up for the first time on its present visit to the sun's neighborhood. The discovery was made by Dr. Hamilton M. Jeffers of Lick Observatory.

One of the most reliable of all the comets as well as shortest in period, Encke's comet has been observed to make its return every three and a third years for more than a century.

It is now very faint and visible only through the largest telescopes. It is a diffuse spot of light without a tail. It was spotted at just about the place in the heavens that computations made months ago indicated that it would appear.

Details of the re-discovery of this comet have been relayed through Harvard College Observatory to astronomers throughout the world.

The returning "prodigal" is a diffuse, faint object far outshone by thousands of stars. It is just visible to the naked eye under the most favorable conditions and nearest approach to the earth. Now it is detectable through only the largest telescopes.

Yet it is a remarkable celestial object because it alone among the comets seems to meet with some sort of resistance that retards its motion in its travels through planetary space.

The fact that it returns to the sun's vicinity more frequently than any other comet, every 3.30 years, also makes it noteworthy.

Encke's comet was discovered in 1786 but it takes the name of the astronomer who first recognized its periodicity in 1819. Since then it has been observed at every one of the 34 visits that it has made to the earth's part of the solar system where it can be seen by astronomers.

In 1931 the rediscovery was made by a Spanish astronomer, while in both 1924 and 1927 it was first picked up by Dr. George Van Biesbroeck of Yerkes Observatory, Williams Bay, Wis.

Ability to predict by computations where a comet will reappear after months and years of absence amazes laymen but is a common and successful practice among astronomers.

It may seem paradoxical that the unknown resistance that Encke's comet encounters in its path near the sun makes the visits of the comet more frequent and actually increases its speed over most of its orbit. It gains more speed by falling nearer the sun than it loses by the direct effect of the resistance.

Science News Letter, July 21, 1934

GEOLOGY

Granite Changed To Sandstone and Shale

ROCKS that were originally sandstones, limestones, and slates have been found mysteriously changed by nature into granite. This is a most surprising phenomenon, since geologists heretofore have classed granite as a type of igneous rock that developed from a molten mass of material formed at considerable distances below the earth's surface.

Dr. G. H. Anderson, research geologist of the California Institute of Technology, made this discovery in the Inyo Mountains of California, during a study of the rock material composing the core of the range.

Batholiths, essentially masses of igneous rock, are common to almost every mountain range and invariably are composed of granite rock. Rising from the depths of the earth, the molten batholithic material engulfs and melts rocks in its path, but solidifies before reaching the surface. Other dynamic forces produce shears or faulting in the crust and eventually uplift a tremendous rock mass, forming the mountain with the batholith as its core.

In the Inyo Mountains, during pre-Cambrian time, over 500,000,000 years ago, sedimentary rocks were being deposited in a sea that occupied the present position of the range. Since the recession of the sea and the present development of the mountains, certain chemical substances in solution, emanating from a batholith in the earth's interior, caused alterations and replacements in the sediments, making them virtually indistinguishable from a true granite.

Some of the striking features upon which Dr. Anderson based his conclusions are the preservation of the apparent bedding of the original sediments, the sedimentary relics found in the transposed granite, and the gradation of remnant sedimentary material into the granite. Numerous chemical analyses of different samples of the granite combined with petrographic studies substantiated Dr. Anderson's discovery.

Science News Letter, July 21, 1934

SEISMOLOGY

Earthquake Rocks Sea Floor in Caribbean

AS THOUGH to celebrate the presence of President Roosevelt in the Caribbean Sea, the sea floor of a portion of that area was shaken by an earthquake on Monday, July 9. The location of the center of this submarine quake has just been determined through the use of earthquake messages gathered by Science Service from seismograph stations.

The weak shock was remote from the course of the President's voyage as it was about 125 miles northwest of Jamaica and 150 miles south of Cuba. Even if the Presidential flotilla had passed over the earthquake area when the quake happened, there would have been felt no more than a harmless jolt. Aboard a ship at sea is one of the safest places during an earthquake.

The Coast and Geodetic Survey determined the epicenter of the July 9 quake as about 19 degrees north latitude and 80 degrees west longitude.

A sharp earthquake rocked the sea bottom about one hundred miles off the northern coast of California on Friday, July 6, at 5:48.3 p. m., Eastern Standard Time, according to data received telegraphically by Science Service and interpreted by scientists of the U. S. Coast and Geodetic Survey. The epicenter was located at 42 degrees north latitude, 126 degrees west longitude.

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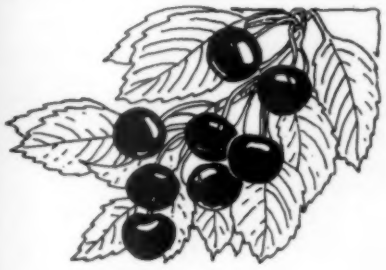
BOTANY

NATURE RAMBLINGS
by Frank Thone



Life at the Tips

LIFE IN PLANTS as a rule has its most active manifestations at branch-tips and root-tips!

The parts of a plant that are most concerned with growth, and those that most vigorously carry on the business of extracting the means for a living from the outer world, are those nearest the outside. Roots do most of their growing in a little zone, perhaps half an inch long in the most active of them, right behind the tiniest tips of the tiniest rootlets. In most roots the growing zone is not even so long as that.

Immediately back of the growing zone is another, not much more extensive, provided with extremely thin-walled hair-like cells. This is the active zone of absorption, which takes in most of the water and salts dissolved in it that the plant uses in life processes.

Growth at the branch-tips also is the most active in adding new substance to the overground parts of the plant, and in increasing its height. Here the branches are lengthened, including the central sprout, or "leader" that increases the length of the main stem, or in trees the trunk. Once hardened into wood, or even toughened into mature herb-fiber, the trunk does not add even a fraction of a cubit to its stature.

At the branch-tips also the leaves are formed, which are the plant's indispensable food-factories. In them the water from the soil and carbon dioxide from the air are combined into sugars and starches, and these in turn receive the addition of nitrates that also came up with the water taken in by the active region at the remote root-tips, to form proteins and the very stuff of life itself, protoplasm.

Branch-tips of most woody plants leave behind them, as they grow ever outward, a sort of cometary trail, a sheath of living cells that covers the plant's whole body immediately under the bark. This is the cambium layer. Thin as it is, it is the only really thoroughly alive part of a tree trunk or mature woody branch.

This heritage of the living tips builds the trunk thicker and stronger year by year, it aids in the repair of wound damage, it sometimes produces the sudden odd buds right from the side of a thick branch that at once astonish and delight us with flowers and fruit in places where they do not belong.

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BIOLOGY

Strange Creatures Sought In Far Corners of the Earth

IN FAR Tibet, Alaska, Siam, Bolivia and other corners of the earth, a dozen scientific expeditions are working to bring back to Philadelphia's Academy of Natural Sciences exhibits and specimens ranging from minute mollusks to huge moose.

Africa—Seeking the bongo, okapi, giant eland, addax, scimitar-horned oryx and dwarf buffalo, George Vanderbilt of New York is heading an expedition from Nairobi to Timbuctoo, thence across the Sahara to Algiers.

China and Tibet—A caravan of yaks and coolies at Chungking is about to carry a party headed by Brooke Dolan, II, of Philadelphia, 500 miles overland to Batang to spend a year in Tibetan borderland wilds collecting birds, mammals, fishes and plants.

Bolivia—M. A. Carriker, Jr., and son are studying birds in the Bolivian Andes just below the snowline.

Wyoming—To secure wapiti or American elk and pronghorn antelope groups, Prentiss N. Gray of New York and R. R. M. Carpenter of Wilmington, Del., and their sons, together with C. Clarke Rosenkranz, artist, will base at Jackson's Hole.

Siam—A field staff with headquarters in Bangkok is collecting birds, fishes, reptiles, insects and mammals.

Alaska—A bull moose of unusual size will be hunted by Frank B. Foster in Kenai Peninsula.

Southwestern U. S.—Plants of remote mountain regions of Texas, Arizona, New Mexico, California and Colorado are being hunted by Dr. W. M. Benner.

Mexico—Mollusks and plants are being sought by Drs. Henry A. Pilsbry, Francis W. Pennell and Cyril H. Harvey.

Greenland—In Capt. Bob Bartlett's schooner *Morrissey*, a party headed by William K. duPont Carpenter is collecting birds, fishes and animals of land and sea.

New Mexico—More evidence that man lived in America 15,000 years ago is being sought by Edgar B. Howard in excavations near Clovis and Carlsbad.

West Indies—James Bond sought birds.

Louisiana—Edward Woolman and Wharton Huber took movies of blue geese and collected mammals and birds.

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PHYSICS

Find Another Way To Make Radioactive Nitrogen

STILL another way of making radioactive nitrogen is reported by the Soviet scientists A. J. Alichanow, A. J. Alichanian and B. S. Dzelepow to the British scientific journal, *Nature*.

In the experiments atomic "bullets" consisting of alpha particles, the nuclei of helium atoms, were shot at the element boron.

The supposed reaction was that an atom of helium (mass 4) plus an atom of boron (mass 10) produced an atom of radioactive nitrogen (mass 13) plus a neutron (mass 1).

In comparable American experiments Dr. R. Crane and Prof. C. C. Lauritsen of California Institute of Technology have produced radioactive nitrogen, possibly in the following way: an atom of carbon (mass 12) plus a deuton (mass 2) produces radioactive nitrogen (mass 13) plus a neutron (mass 1). Thus starting from either carbon or boron—two entirely different elements—radioactive nitrogen was created by the impact of the right sort of bombarding particles.

This article corrects a previous report. (*See SNL July* 7, 1934, *p.* 3).

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First Glances at New Books

Psychology

DEVELOPMENTAL PSYCHOLOGY—Florence L. Goodenough—*Appleton-Century,* 619 p., $3. A first book on psychology for the beginning student, this book is simply and clearly written but so interesting that it will appeal strongly to any adult who is interested in his fellow men. The development of the individual is followed from his beginnings in the hereditary background through the years of pre-natal life, infancy, childhood, adolescence and maturity to old age. The psychologist will be interested to note the psychological device employed by the author when she put questions on the chapter, not as a catechism at the end, but in a thought-provoking position at the outset.

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General Science

SCIENCE PROBLEMS OF MODERN LIFE—Ellsworth S. Obourn and Elwood D. Heiss—*Webster Pub. Co.,* 184 p., $1.44. A well-planned textbook in general science for the younger generation of students, with blanks for recording answers to questions incorporated at the end of each chapter.

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Education

THE HORIZONTAL ORGANIZATION OF SECONDARY EDUCATION—Grayson N. Kefauver, Victor H. Noll and C. Elwood Drake—*Govt. Print. Off.,* 273 p., 20c. Monograph No. 2 of the National Survey of Secondary Education. Secondary schools, with pupils numbering nearly four and a half million, are no longer college-preparatory institutions. The popularizing of the secondary school has called for changes in organization and curriculum, which are here discussed.

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Ethnology

EARLY DAYS AMONG THE CHEYENNE AND ARAPAHOE INDIANS—John H. Seger, edited by Stanley Vestal—*University of Oklahoma Press,* 155 p., $2. A white man who lived in the Indian country of Oklahoma in the latter half of the nineteenth century ought to have colorful stories to tell. Mr. Seger was in close contact with these Indians for fifty years, and he was a good story teller. This is the second edition of his memoirs, which have gained a place in pioneer western literature. The first edition of 1923 has been out of print for some years.

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Ethnology

THE LUMMI INDIANS OF NORTHWEST WASHINGTON — Bernhard J. Stern—*Columbia University Press,* 127 p., 5 pl. $2. A well-arranged monograph describing culture and lore of a tribe that now occupies a reservation in Washington State. These Indians resemble other tribes of the region in looking upon wealth as the badge of prestige and in laying stress on genealogy. The dances described are especially interesting.

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Hygiene

HYGIENE AND HOME NURSING—Louisa C. Lippitt—*World Book Co.,* 424 p., $1.24. The author, a registered nurse and the daughter of a physician, believes that women need special instruction on caring for their own health and that of their families. The book she has written for this purpose is simple, practical and comprehensive.

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History

ANCIENT AND MEDIEVAL HISTORY—Ralph V. D. Magoffin and Frederic Duncalf—*Silver, Burdett,* 860 p., 34 maps, $2.24. Most general history courses have become courses in civilization. Kings and battles are pushed back, and the emphasis is laid on the stream of progress. This school text is carefully shaped to the new pattern, and povides a good introduction to the record of civilization. It is written informally, for easy reading. There are a great many attractive pictures.

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Photography

PRACTICAL RETOUCHING—Frank R. Frapie—*American Photographic Publishing Co.* 63 p., 50c. New and sixth edition of volume 9 in Practical Photography series.

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Acoustics

APPLIED ACOUSTICS—Harry F. Olsen and Frank Massa—*Blakiston,* 430 p., $4.50. The "first American" book dealing entirely with acoustical engineering principles tells how and why the present variety of sound instruments and apparatus work. Architectural acoustics and noise measurements occupy 100 pages of the text. Footnotes from the literature of sound mark the volume as one for reference for technicians in the field who wish to go back to original sources of material.

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Photography

INFRA-RED PHOTOGRAPHY—S. O. Rawling—*American Photographic Publishing Co.,* 57 p., $1.50. Second printing of the English handbook of practical infra-red photography by a research expert of Ilford Ltd. Assuming a reader background of ordinary elementary photography, the author describes present-day infrared photography, Intentionally omitting for brevity the historical aspects or the chemical research from which the numerous sensitizers for the infra-red were evolved.

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Photography

HOW TO MAKE LANTERN SLIDES—Frank R. Frapie—*American Photographic Publishing Co.,* 80 p., 50c. A reprint of volume 7 of the time-honored Practical Photography Series. It tells how to make slides in white and black, toned, dyed or in natural color on glass or film.

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Child Hygiene

THE ROAD TO ADOLESCENCE—Joseph Garland—*Harvard University Press,* 293 p., $2.50. This well-written, practical book is for parents with children from five to fifteen years of age. The subjects covered range all the way from anatomy to summer camps, toys and nursery schools. The book consists of simply told facts about these various subjects and wise advice on how to care for the child during the years between nursery and adolescence.

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